Introduction to Manufacturing

Career Cluster	Manufacturing
Course Code	13002
Prerequisite(s)	None
Credit	.5 per semester
Graduation Requirement	
Program of Study and Sequence	Foundation courses – **Introduction to Manufacturing** – entry pathway course in any of four manufacturing pathways
Student Organization	Skills USA
Coordinating Work-Based Learning	Field trips or guest speakers
Industry Certifications	Options of OSHA 10, AWS SENSE Certification, or AWS Safety Certification
Dual Credit or Dual Enrollment	
Teacher Certification	
Resources	

Course Description:

Introduction to Manufacturing provides entry level exposure and career exploration in the manufacturing industry. This comprehensive course teaches students the various methods used to process and transform materials. Includes skills common to all manufacturing occupations such as reading working drawings, safety, hand and power tools, bonding casting, forming computer automations, LEAN manufacturing, soldering, metallurgy, and various welding processes. Students will learn the business and design process of manufacturing industry.

Planning, managing and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.

Program of Study Application

Introduction to Manufacturing is a cluster course in the Manufacturing program of study. Upon completion of Introduction to Manufacturing, a student will be prepared to take an entry pathway course in any of the four manufacturing pathways: welding, machining, design/engineering, or automation.

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Course Standards

IM 1: Career exploration and development.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	IM 1.1 Recognize the various career pathways/occupations that are available in manufacturing process/industry/business.	SD MyLife @ http://sdmylife.com/ Or other career exploring programs
Four Extended Thinking	IM 1.2 Design a career path for individual career interest in the manufacturing cluster.	Career Pathways • Welding • Machining • Design/Engineering • Automation

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IM 2: Plan, manage and perform the processing of materials into intermediate or final products and understand related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	IM 2.1 Develop a business plan for manufacturing operations.	South Dakota Manufacturing and Technology Solutions http://sdmanufacturing.com/
One Recall	IM 2.2 Explain trends and issues in the manufacturing industry.	Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis
Three Strategic Thinking	IM 2.3 Summarize how planning a budget is used in manufacturing and/or business.	LEAN Manufacturing Principles @ http://www.sdmanufacturing.com/services/lean/
Two Skill/Concept	IM 2.4 Summarize how material controls are related to the production of products.	LEAN Manufacturing Principles
Two Skill/Concept	IM 2.5 Compare how social and economic changes have had an effect on business and various manufacturing processes.	
Three Strategic Thinking	IM 2.6 Describe the cause and effect of risk management as it relates to a business or manufacturing process.	
Two Skill/Concept	IM 2.7 Identify the roles and functions of government in regulating and supporting manufacturing business	
Three Strategic Thinking	IM 2.8 Demonstrate a management plan for the manufacturing process for the production of a product and/or business	Writing a Business Plan South Dakota Business Help @ http://sdbusinesshelp.com/
Two Skill/Concept	IM 2.9 Identify and apply accounting procedures	

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IM 3: Implement manufacturing technology safety practices.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	IM 3.1 Maintain general safety in accordance with government regulations, health standards, and company and/or school policy.	American Welding Society- School Excelling through National Skills Standards Education- (AWS SENSE) Safety Certification @ http://awo.aws.org/sense/ AWS Safety Certification @ http://awo.aws.org/seminars/safety/ Occupational Safety and Health Administration OSHA10 @ http://www.careersafeonline.com/index.php/component/content/article/9-courses/36-osha-10-hour-construction-industry
Two Skill/Concept	IM 3.2 Evaluate ergonomic factors associated with the manufacturing industry.	
Two Skill/Concept	IM 3.3 Identify state, federal and local worker safety, health and environmental regulations including correct use and storage of hazardous materials according to current safety standards.	Occupation Safety and Health Administration-(OSHA) Regulations @ https://www.osha.gov/ Safety Data Sheet (SDS)

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IM 4: Apply ethical practices in the workplace as they relate to today's society.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	IM 4.1 Identify and display professional practices in the workplace.	Student Handbook Classroom Rules Americn College Testing Program (ACT) KeyTrain Soft Skills Suite @ http://www.keytrain.com/softskills.asp

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IM 5: Utilize the appropriate tools and equipment used in the manufacturing industry.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	IM 5.1 Use basic tools and equipment common to the manufacturing processes.	

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IM 6: Differentiate among a variety of manufacturing industries.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	IM 6.1 Differentiate products/components in relationship to size, proportion and tolerances.	ADDA Mechanical Drafting Standards
Two Skill/Concept	IM 6.2 Interpret working drawings and schematics.	
Four Extended Thinking	IM 6.3 Design a working drawing and/or a schematic circuit.	Electronics/Robotics Standards
One Recall	IM 6.4 Describe electron theory and the related laws that apply. Examples not limited to: • Ohm's/Watt's Law Video link- https://www.youtube.com/watch?v=CztiI0re5Eo • Coulomb's Law Video link- https://www.youtube.com/watch?v=gKKCcIzLHFU • DC Circuit Laws Video link- https://www.youtube.com/watch?v=u0ZIARKFQBU • Kirchoff's Law Video Link- https://www.youtube.com/watch?v=0gRtVz4XrZM • Voltage Divider Rule Video Link- https://www.youtube.com/watch?v=rIEnMpgIaU4	
One Recall	IM 6.5 Describe basic hydraulic and pneumatic systems and the related laws that apply. Examples not limited to: • Boyle's Law Video Link- https://www.youtube.com/watch?v=oiMMJJH8Phs • Bernoulli's principles Video Link- https://www.youtube.com/watch?v=8vqMotb6m3c	.

One Recall	IM 6.6 Describe concepts and usage of robotics/automation in manufacturing.	
One Recall	IM 6.7 Describe welding procedures for various materials.	Welding/Advanced Welding Standards
One Recall	IM 6.8 Describe various material joining processes.	
One Recall	IM 6.9 Identify machining procedures for various materials/processes.	
One Recall	IM 6.10 Describe the application of basic mechanical physics. Examples: • Newton's Laws of Motion and Forces Video Link- https://www.youtube.com/watch?v=NYVMlmL0BPQ	
One Recall	IM 6.11 Describe how various materials (recyclable, ferrous/nonferrous, and synthetic) are produced and used in manufacturing.	
One Recall	IM 6.12 Explain the impact of emerging technologies in manufacturing.	
One Recall	IM 6.13 Describe basic metallurgy and metal processing.	

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IM 7: Design and create a product using the engineering design loop.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	IM 7.1 Develop a prototype of a product.	Engineering Design Process
Four Extended Thinking	IM 7.2 Test and evaluate a product.	
Three Strategic Thinking	IM 7.3 Redesign product for final production.	

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